



Weather

WEATHER RADAR OBSERVATIONS

This instruction implements AFPD 15-1, *Atmospheric and Space Environmental Support*. It provides instructions for taking, transmitting, and using weather radar observations and implements Federal Meteorological Handbook (FMH) 7 (Parts A and C), *Weather Radar Observations*. It applies to all Air Force units with conventional (non-Doppler) weather radars or dial-up weather radar services. (Doppler weather radar procedures are covered in FMH 11 (Parts A through D), *Doppler Radar Meteorological Observations*, and AFSUPs 1 to FMH 11 Parts A and D.) Send comments and suggested improvements through channels to HQ AWS/XOO, 102 Losey St., Room 105, Scott AFB IL 62225-5206.

SUMMARY OF CHANGES

This is the initial publication of AFMAN 15-113. It deletes the operating procedures of a conventional weather radar (which are contained in technical orders or other publications) and updates the standard applications operating instructions formerly contained in AFP 105-13.

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Chapter 1

OPERATIONAL CONCEPTS AND RESPONSIBILITIES

1.1. Weather Radar Program. All continental United States (CONUS) Air Force units with a conventional weather radar and having meteorological watch and forecasting responsibilities will take and disseminate weather radar observations according to FMH 7 Parts A and B and the procedures given in this manual. Major commands (MAJCOM) will provide direction on disseminating routine weather radar observations in data sparse or overseas areas to support local, regional, or national weather radar networks using local, regional, or national reporting criteria, codes, and procedures.

1.2. Responsibilities: Units with conventional weather radars will:

1.2.1. Implement local procedures to ensure weather radar observations and products are accurate, representative, disseminated in a timely manner, and effectively integrated in observing, forecasting, briefing, and meteorological watch services.

1.2.2. Establish procedures for the cooperative use of radar information from nearby air traffic control radars (GCA, RAPCON, ARTCC, or GCI) when the local weather radar or remote equipment is not operational.

1.2.3. Designate a weather radar coordinator to manage the unit's weather radar program. The coordinator will ensure:

- Unit personnel are fully qualified in operating the equipment when duties require.
- Training is conducted each season to refresh and train personnel on the seasonal variation in weather radar signatures for seasonal weather phenomenon.
 - A weather radar reference library is established and maintained.
 - Specialized radar support requirements.

1.2.4. Provide cooperative support to the National Severe Storms Watch as stated in this manual. Units in the CONUS are responsible for identifying and reporting tornadoes, severe thunderstorms, and hailstorms. Disseminate the report of the phenomena in the following order:

- Locally
- Longline
- Notify the National Weather Service's (NWS) Weather Service Office (WSO) or Weather Service Forecast Office (WSFO) having forecast and warning responsibility for your area. Document your level of cooperation in a support agreement or other document, as determined by your base.

1.2.5. Provide weather radar information, upon request, and when available to the Air Force Global Weather Central (AFGWC), the National Hurricane Center (NHC), the National Meteorological Center (NMC), the National Severe Storm Forecast Center (NSSFC), or any other weather center operated by the Air Force, Navy, or the National Oceanic and Atmospheric Administration (NOAA).

1.2.6. Establish well defined procedures to manage a severe weather threat. Procedures should establish criteria for the recall of senior weather station personnel, identify who is to be called, and provide guidance for the assignment of specific tasks during a severe weather threat.

1.3. Support to National Hurricane Operations. Howard AFB Panama will provide weather radar observations to support national hurricane operations as stated in the National Hurricane Operations Plan.

Chapter 2

OPERATIONS

2.1. General Applicability. This chapter applies to Air Force locations as specified. This chapter specifies requirements for local weather radar programs and provides suggestions for efficient and effective use of the radar.

2.2. Radar Support and Standby. All Air Force units with conventional weather radars will observe and report weather radar observations using the instructions in FMH-7A, this AFMAN, and local procedures and agreements.

2.2.1. Units do not need to transmit specials at H+10 as stipulated in FMH-7A, 10.2.1.

2.3. Limited Duty Forecast Locations. Units will develop procedures for recalling a forecaster or remaining open during severe weather situations in order to exploit radar data available locally.

2.3.1. When an observer is on duty but a forecaster is not, units will develop procedures for recalling a forecaster during severe weather situations. Suggested criteria include:

- Weather meeting special criteria is observed on the weather radar.
- Weather meeting local warning criteria is reported within 120 NM.
- The local unit, AFGWC, or any DoD centralized weather facility issues a severe weather warning for the station.

2.3.1. All units with limited duty forecast services will establish procedures to ensure a forecaster is notified whenever another base agency (i.e., command post) receives a notification of a weather warning or report of severe weather occurring within their area of responsibility.

2.4. Work Area Communications. The weather radar operator must keep the duty observer aware of all developments on the radar. Correspondingly, the duty observer must notify the weather radar operator of developments and information on observed weather, particularly information which might escape radar detection due to ground clutter, low elevation angle, or use of range normalization.

2.5. Posting Height of Tropopause. Post the latest tropopause height at or near the radar or remote equipment daily. Post date and time of data. If a single sounding is used to determine the height of the tropopause, display the call sign of the station taking the sounding with the tropopause data. When a single sounding is not representative of the entire range, display a field of tropopause heights.

2.6. Figures and Tables. Units will determine locally which items will be available at the radar console. Include the appropriate Pr-Ze (echo intensity) nomogram and height correction graphs and situate them so they are always displayed.

2.7. Radar Scope Overlays.

2.7.1. Stations with Pilot-to-Metro Service (PMSV) capability should prepare radar scope overlays for the planned position indicator (PPI) scope if they do not have electronically generated overlays available on their radar. These overlays can be used to describe weather to aircrews in terms of known reference points. When used, the overlays must be made to fit on the PPI scope and show the positions of navigational references within the range of the scope.

2.7.2. Overlays may also be constructed for other uses, e.g., flying training areas and local radar training.

2.8. Weather Radar Reference Library. Units with weather radars should maintain a weather radar reference library. Recommended publications are listed in Table 2.1.

2.8.1. Units that do not have weather radars but have dial-up radar information will maintain as a minimum this AFMAN, and FMH-7, Parts A and B.

2.8.3. Publications are available through the Air Force publications system, the technical order system, or your local library. Air Weather Service (AWS) technical documents are available through the AWS Technical Library (AWSTL), USAFETAC/DOL, Bldg 859, Scott AFB IL 62225-5116.

Table 2.1. Recommended Radar Reference Library.

Books:	
Battan, L. J., <u>Radar Observation of the Atmosphere</u> , (Chicago, Univ of Chicago Press, 1973), 324 pp.	
Hiser, H. W., <u>Radar Meteorology</u> , Third Edition, (Coral Gables, Univ of Miami, 1970), 79 pp.	
Fujita, T. T., <u>The Downburst</u> , 1986 Edition, (University of Chicago), 122 pp.	
Federal Meteorological Handbooks:	
FMH 7 (Part A)	
FMH 7 (Part B)	
Technical Reports, Notes, and Articles:	
USAFETAC/TN/73-2 , <i>The Ocheltree Tornadoes</i> , Finely, W. E., C. A. Perry, and B. W. Brown, May 1972	
AWS/TR-77-271 , <i>New Severe Thunderstorm Radar Identification Techniques and Warning Criteria</i> , Lemon, L. R., November 1977	
AWS/TR-76-266 , <i>Radar Scope Interpretation: Severe Thunderstorms and Tornadoes</i> , Whiton, RC and Hamilton, R. E.	
AWS/FM-83/010 , <i>The Reliability of the Bow Echo as an Important Severe Weather Signature</i> , Przybylinski, Ron W. and Gerry, William J., November 1983	
NOAA Training Paper NWS TC-1 , <i>Doppler Weather Radar Principles</i> , Covey, Daryl L., January 1983	
AWS/TN-83/001 , <i>The Operational Meteorology of Convective Weather, Vol I: Operational Mesoanalysis</i> , Doswell, C. A., November 1982	
AWS/TN-85/001 , <i>The Operational Meteorology of Convective Weather, Vol II: Storm Scale Analysis</i> , Doswell, C. A., April 1985	
Technical Orders:	
Appropriate volume or volumes containing the operator's instructions.	
Air Force Visual Aids:	
Appropriate AFVAs for your radar:	
AFVA 15-102	AN/FPS-77 Radar Performance Checks-Intensity of Fixed Ground Targets
AFVA 15-103	AN/FPS-77 Radar Performance Checks-Range Normalization
AFVA 15-104	AN/FPS-77 Radar Performance Checks-A/R Scope Range Marks
AFVA 15-105	AN/FPS-77 Radar Performance Checks
AFVA 15-106	AN/FPS-77 Console Emergency Stop Procedures
AFVA 15-107	AN/FPS-77 Console Standby Run-down Procedures
AFVA 15-109	AN/FPS-77 Console Start Procedures
AFVA 15-110	Speed of Movement of Radar Echoes
AFVA 15-111	Range Normalization Graph
AFVA 15-112	Corrections to Echo Bases Graph
AFVA 15-113	Correction to Echo Tops Graph
AFVA 15-114	AN/FPS Nomogram

Chapter 3

OBSERVING AND REPORTING PROCEDURES

3.1. General Responsibilities. This chapter applies to all units with conventional weather radars. Unless otherwise noted in this chapter, units will follow procedures in the FMH 7 (Part A) to encode and report radar weather observations.

3.1.1. The requirement in FMH 7 (Part A) to retransmit at H+10 does not apply to Air Force units. Transmit specials according to paragraph 3.4 below.

3.1.2. Air Force units will disseminate observations according to paragraphs 3.3. and 3.4. below.

3.2. Definitions for Radar Weather Observations.

3.2.1. Routine Observation. A complete weather radar observation taken between 0025Z and 0035Z plus each hour (PE1H), e.g., 0035Z, 0135Z, 0235Z, etc.

3.2.2. Special Observations. A weather radar observation taken and recorded on **AF Form 3800**, Radar Weather Observations, whenever any of the criteria in paragraph 3.4 are observed.

3.2.3. NOSPL. A contraction meaning special criteria is no longer occurring.

3.2.4. Severe Thunderstorm. A thunderstorm that produces wind gusts of 50 knots or greater and/or hail 3/4 inch in diameter or greater.

3.2.5. Hailstorm. Any storm or storm system producing hail of any size.

3.3. Observing and Reporting Routine Observations.

Routine weather radar observations need not be disseminated longline unless special criteria are occurring within 120 nm. MAJCOMs may require longline dissemination of routine observations by supplementing this chapter. Observations that are not disseminated longline need not be entered on **AF Form 3800**, Radar Weather Observations.

3.3.1. Take radar observations between 0025Z and 0035Z PE1H when any of the following conditions exist:

- Radar detectable weather is present within 120 nm.
- A centrally or locally produced weather warning or advisory for convective wind gusts of 35 knots or greater and/or hail 1/2 inch in diameter has been issued for supported locations within 120 nm.

3.3.2. Intensify the terminal radar meteorological watch whenever radar detectable convective weather is present within 120 nm. Twenty-minute checks are recommended at a minimum.

3.3.3. Any other situation that is operationally significant.

3.4. Observing and Reporting Special Observations.

(Units with an operational NWS weather radar within 5 nm are exempt from the requirement to transmit special radar observations.)

3.4.1. Take, record, and transmit special observations longline whenever any of the following criteria are first observed and at H+25 to H+35. Continue to disseminate hourly at H+25 to H+35 as long as any of the following special criteria are observed on the radar.

- Any of the criteria in FMH 7 (Part A), paragraph 10.2.2.

• Tornadic activity.

• Severe thunderstorms.

• Hailstorms.

- Any other locally determined criteria or situation that the operator considers a threat to local resources.

3.4.2. Identify special observations on the **AF Form 3800** using SPL as the first entry in column 3 and transmit using USD as the data type.

3.4.3. At locations that do not transmit routine observations, append the contraction NOSPL to the first routine observation following a special observation.

3.4.4. Whenever the occurrence of any special criteria is reported within 120 nm by a non-radar source, take a special observation and include significant information from the source in remarks. Example: PUBLIC REPORTS HAIL 8N RND.

NOTE: When a special observation is transmitted, the contraction SPL is considered part of the transmitted text. When a modifier (such as COR) is used, SPL should be transmitted after the modifier. Example: BLV USD 2210 COR SPL HOOK 320/25.

3.5. Aircraft Mishaps or Damage to Installations. Air Force units will take and record a complete radar weather observation upon notification (whether verified or not) of an aircraft mishap or weather-related damage to the local installation (including compounds, reservations, nearby auxiliary fields, or any other DoD property either assigned to or part of the local installation) that has occurred within 120 nm during the past hour and no intervening routine observation was encoded from the time of the mishap until time of notification. Encode these observations as specials and include the appropriate remark (e.g., ACFT MISHAP or DMG TO INSTALLATION). Disseminate the observation without the remark if the observation meets special criteria.

3.6. Hurricane Observations. All hurricane observation data is encoded in Column 10 of the **AF Form 3800**. Use Figures A1.2 through A1.5 to estimate position of the hurricane eye over water.

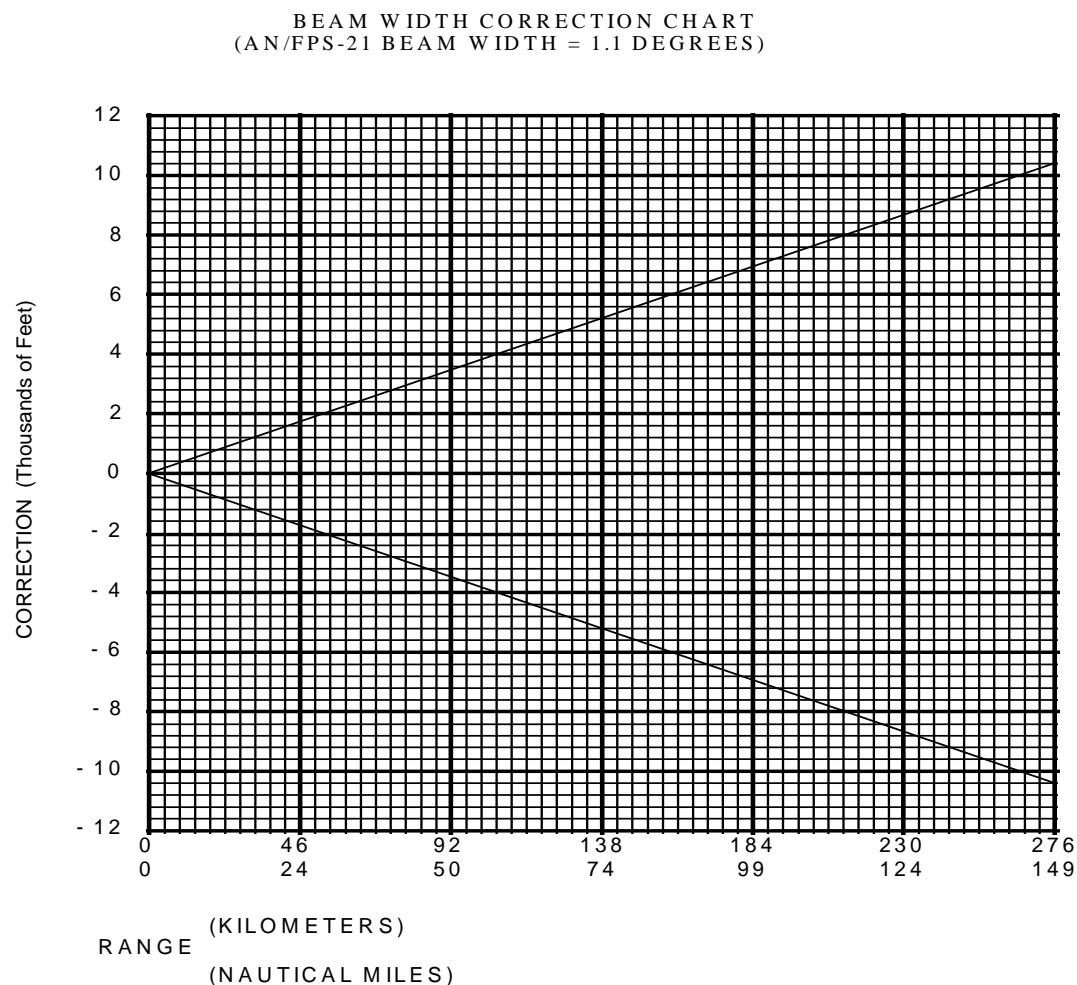
Figure 1.1. RHI Elevation Correction Chart.

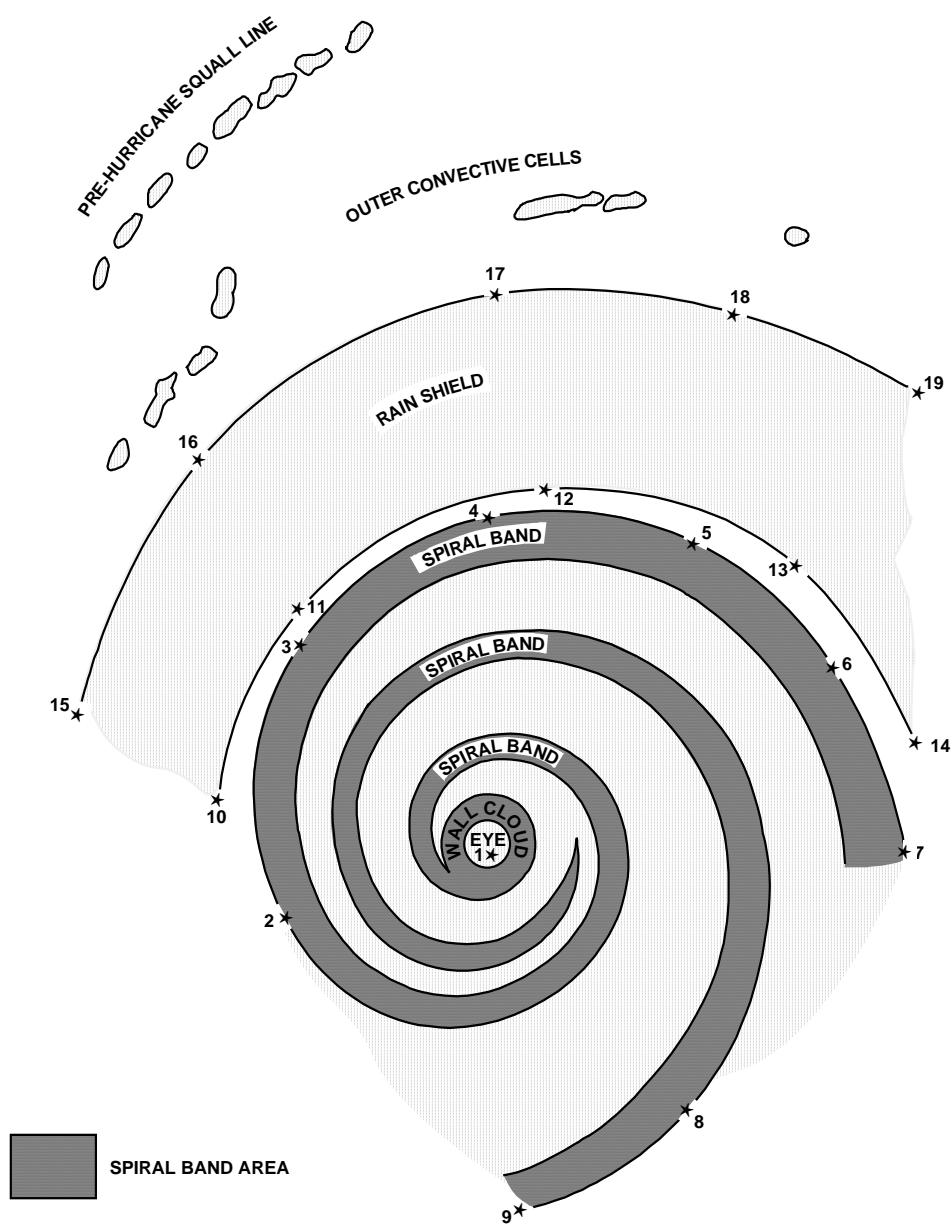
Figure 1.2. Classification of Hurricane or Typhoon Radar Information.

Figure 1.3. Logarithmic Spiral 10 Degree Crossing Angle.

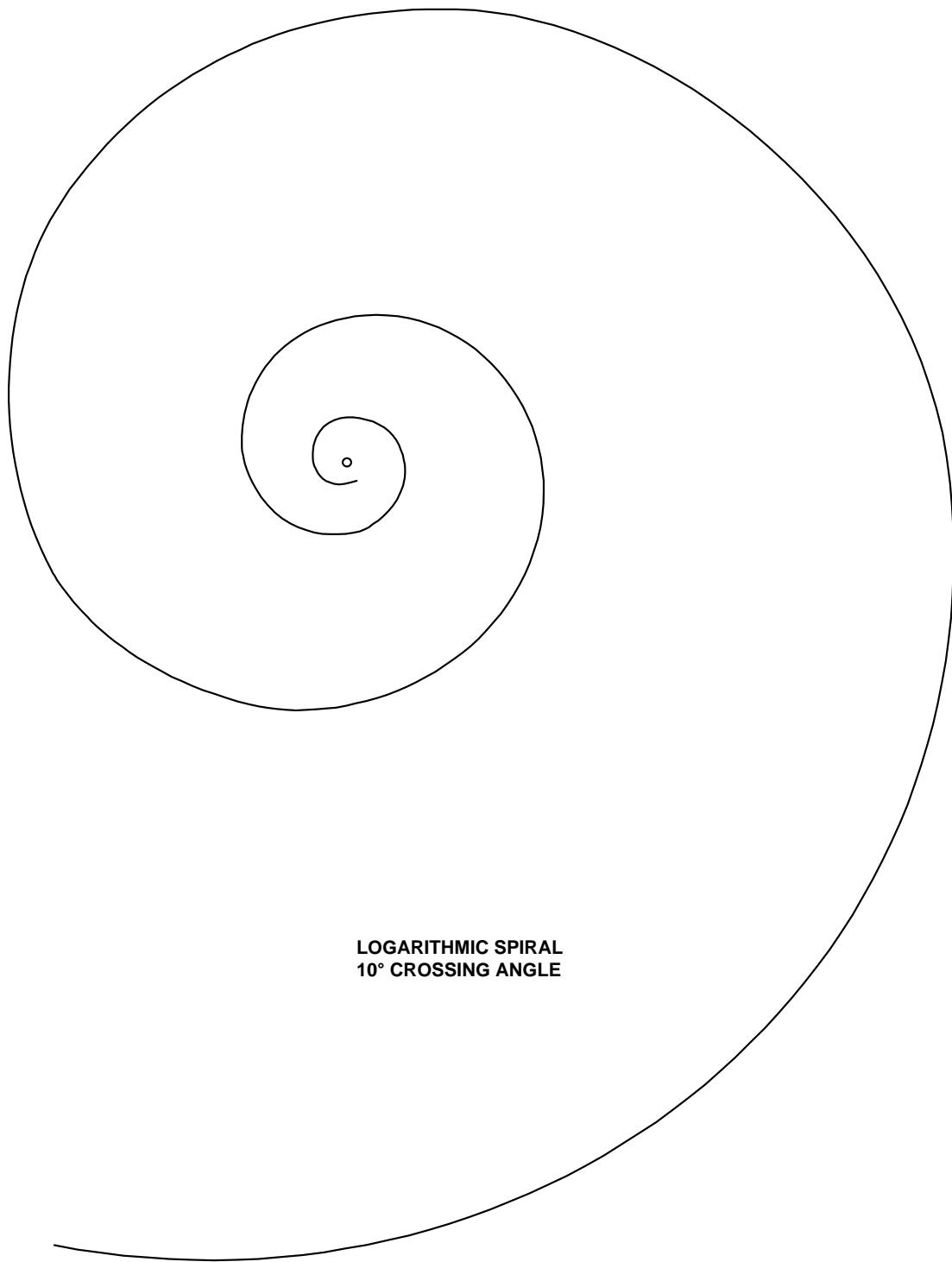


Figure 1.4. Logarithmic Spiral 15 Degree Crossing Angle.

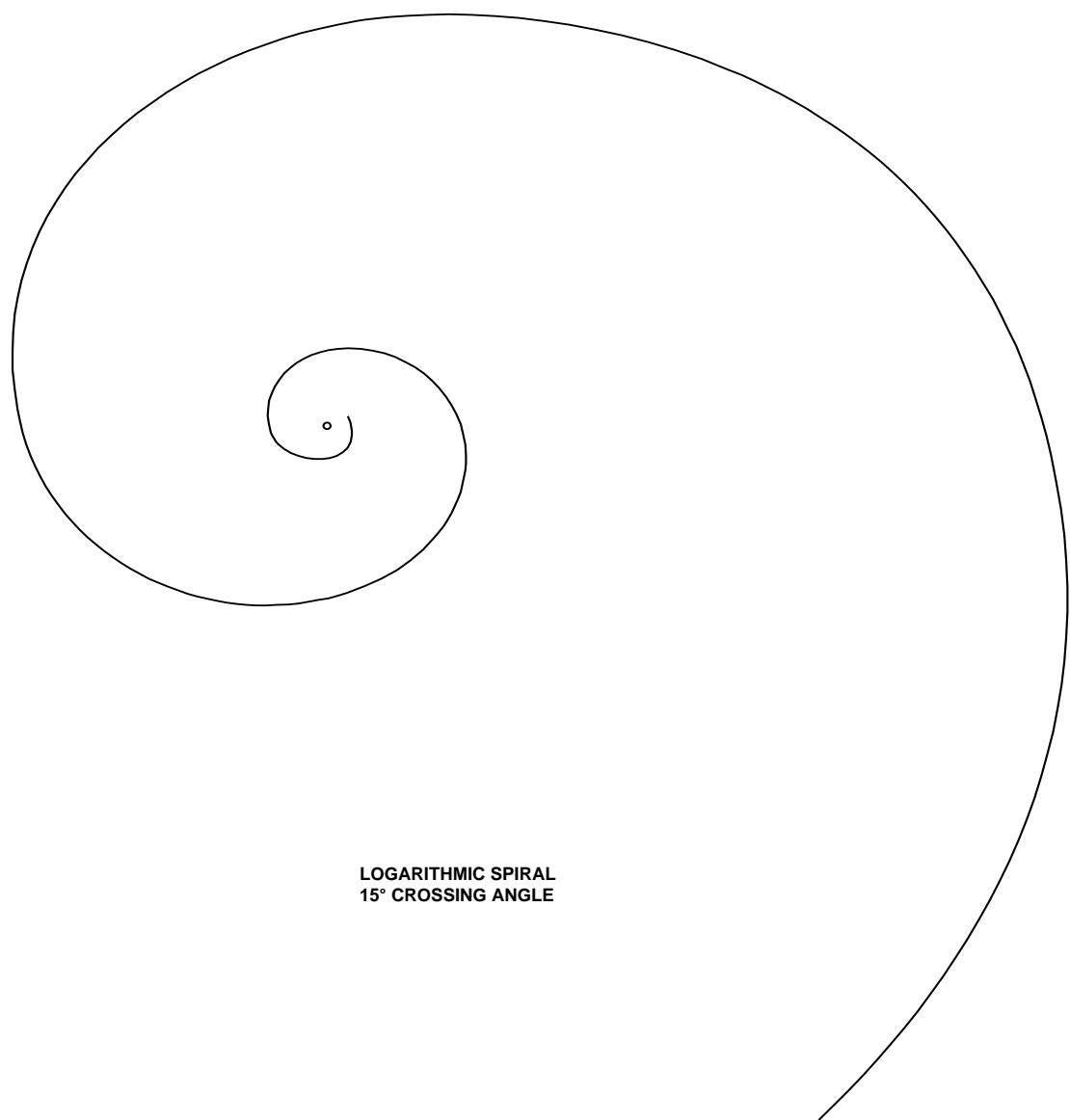
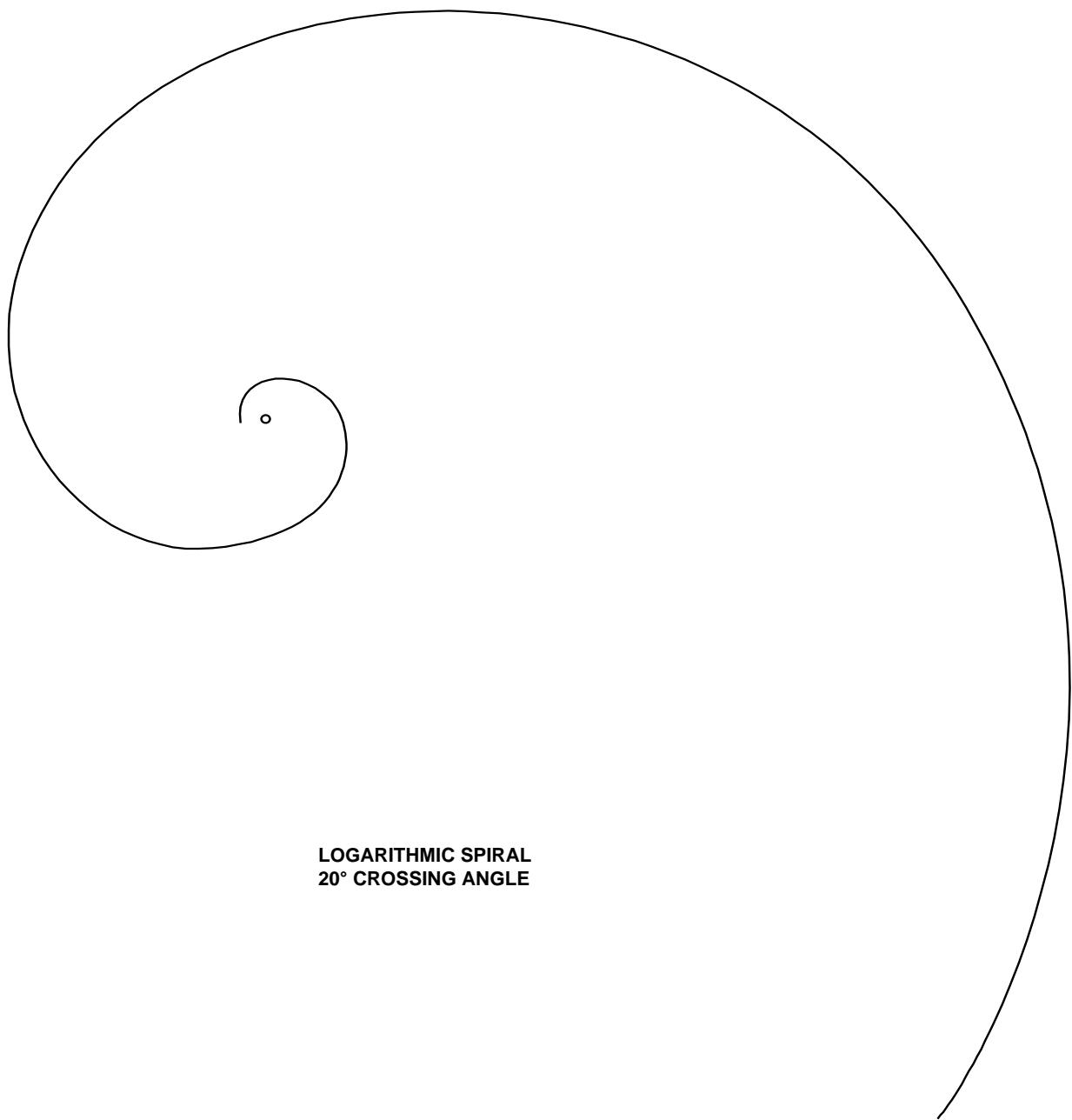


Figure 1.5. Logarithmic Spiral 20 Degree Crossing Angle.



3.7. Operational Status Contractions.

3.7.1. Units required to transmit routine weather radar observations will encode, record, and transmit operational status contractions according to FMH 7A.

3.7.2. Units required to transmit special weather radar observations only will encode and record operational status contractions according to FMH 7A and paragraph 3.4.3 above. These units will transmit all operational status contractions encoded as part of a special observation. These units will transmit one of the following operational status contractions to inform users why transmission of specials was stopped:

3.7.2.1. NOSPL. Transmit whenever appended to a routine observation. The remainder of the observation is not required to be transmitted.

3.7.2.2. PPIOM and PPINA. Transmitted when the last observation prior to the contraction met special criteria. Once transmitted, these contractions are maintained in the Automated Weather Networks (AWN) database for 12 hours. The contraction must be cleared from the AWN database (if within the 12-hour time-frame) when the condition requiring the contraction no longer exists.

Clear these contractions by sending a special observation or NOSPL, whichever is appropriate. It is not required to retransmit the contraction if the condition persists past the 12-hour point.

3.8. Miscellaneous Procedures. Units are encouraged to initiate and maintain a radar study to identify local criteria and characteristics for the identification of severe convective weather. These local effects should be included in the list of special criteria. AWS/TR-76-266, *Radar Scope Interpretation: Severe Thunderstorms and Tornadoes*, is the official source of CONUS severe convective weather identification criteria. MAJCOMs with weather personnel outside the CONUS will specify what technical sources to use when they participate in host nation storm watch programs. MAJCOMs who provide weather personnel to overseas locations should identify what technical sources personnel should use when deployed, so they may become familiar with them before deployment.

3.9. Form Prescribed. AF Form 3800.

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CONVENTIONAL WEATHER RADAR TABLES

Table A1.1. IF Attenuator/Iso-Echo Thresholds for Echo Intensity Estimation, AN/FPS-77.

Range Normalization									
		30 NM		60 NM		120 NM		Rainfall	
Echo Intensity		Min	Max	Min	Max	Min	Max	Rate (in hr-1)	
Weak (-)		30		24		18		< 0.1	
Moderate (-)		33	39	25	33	20	27	0.1 - 0.5	
Strong (+)		42	45	36	39	30	33	0.5 - 1.0	
Very Strong (++)		48	51	42	45	36	39	1.0 - 2.0	
Intense (X)		54	57	48	51	42	45	2.0 - 5.0	
Extreme (XX)		60		54		48		>5.0	

Table A1.2. IF Attenuator/Iso-Echo Thresholds for Echo Intensity Estimation, AN/TPS-68.

Sensitivity Time Control			
Echo Intensity	Min	Max	Rate (in hr-1)
Weak (-)		18	< 0.1
Moderate (-)	19	29	0.1 - 0.5
Strong (+)	30	33	0.5 - 1.0
Very Strong (++)	34	38	1.0 - 2.0
Intense (X)	39	45	2.0 - 5.0
Extreme (XX)	46		> 5.0

Table A1.3. Alternate Method of Determining Cloud Top Heights for AN/FPS-77 (hundreds of feet). Actual height of top is height from the table plus the MSL height of the antenna.

Range (nm)	Elevation Angle (degrees)												
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
5	0	1	7	12	7	22	28	33	38	43	49	54	59
10	0	3	13	24	35	45	56	66	77	87	98	108	119
15	0	5	21	36	52	68	84	100	116	131	147	163	178
20	0	7	28	49	70	92	113	134	155	176	197	218	239
25	0	9	36	62	89	115	142	168	194	221	247	273	299
30	0	12	44	76	108	139	171	203	234	266	297	329	360
35	0	16	53	90	127	164	201	238	275	311	348	384	421
40	0	19	62	104	146	189	231	273	315	357	399	441	482
45	0	23	71	118	166	214	261	309	356	403	450	497	544
50	0	27	80	133	186	239	292	344	397	450	502	554	606
55	0	32	90	148	207	265	323	381	439	496	554	611	668
60	0	37	100	164	227	291	354	417	480	543	606	669	731
65	0	42	111	180	248	317	386	454	523	591	659	726	794
70	0	47	122	196	270	344	418	491	565	638	716	785	857
75	0	53	133	212	292	371	450	529	608	686	765	843	921

Table A1.3. Continued.

Table A1.4 Alternate Method of Determining Bases on the AN/FPS-77 (hundreds of feet). Actual height of base is height from the table plus the MSL height of the antenna.

Table A1.5. Average Power (W) to ΔPt (dB) Conversion.

Average Power (W)	ΔPt (dB)	Average Power (W)	ΔPt (dB)
109-110	1.7	157-160	0.1
111-113	1.6	161-163	0.0
114-116	1.5	164-167	-0.1
117-118	1.4	168-171	-0.2
119-121	1.3	172-175	-0.3
122-124	1.2	176-179	-0.4
125-127	1.1	180-183	-0.5
128-130	1.0	184-188	-0.6
131-133	0.9	189-192	-0.7
134-136	0.8	193-197	-0.8
137-139	0.7	198-201	-0.9
140-142	0.6	202-206	-1.0
143-146	0.5	207-211	-1.1
147-149	0.4	212-216	-1.2
150-152	0.3	217-221	-1.3
153-156	0.2		

Table A1.6. Magnetron Frequency Conversion.

Magnetron Frequency (MHz)	$\Delta \lambda^4$ (dB)
5450-5465	0.5
5466-5495	0.4
5496-5525	0.3
5526-5559	0.2
5560-5590	0.1
5591-5625	0.0
5626-5650	-0.1

Table A1.7. Pulse Duration Conversion.

$\gamma(\mu\text{sec})$	$\Delta(\text{dB})$	$\gamma(\mu\text{sec})$	$\Delta(\text{dB})$
1.45	1.4	2.05	-0.1
1.50	1.3	2.10	-0.2
1.55	1.1	2.15	-0.3
1.60	1.0	2.20	-0.4
1.65	0.8	2.25	-0.5
1.70	0.7	2.30	-0.6
1.75	0.6	2.35	-0.7
1.80	0.5	2.40	-0.8
1.85	0.3	2.45	-0.9
1.90	0.2	2.50	-1.0
1.95	0.1	2.55	-1.1
2.00	0.0		

Table A1.8. Tops and Bases Corrections (hundreds of feet) for the AN/TPS-68.

True height is height from RHI, correction, and MSL height of the antenna.

Top Correction (hundreds of feet)	Range (nm)	Base Correction (hundreds of feet)
-3	5	5
-9	10	11
-13	15	17
-18	20	24
-22	25	31
-25	30	38
-27	35	45
-29	40	53
-34	45	61
-34	45	61
-36	50	70
-38	55	78
-40	60	87
-41	65	97
-42	70	107
-42	75	117
-43	80	127
-43	85	138
-42	90	149
-41	95	160
-40	100	172

Table A1.9. Alternate Method of Determining Tops on the AN/FPS-68 (hundreds of feet). Actual height of top is height from the table plus the MSL height of the antenna.

Range (nm)	Elevation Angle (degrees)											
	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
5	0	5	11	16	21	27	32	37	43	48	52	58
10	0	11	22	32	43	54	64	75	86	96	107	117
15	1	17	33	49	65	81	97	113	129	145	161	177
20	3	24	45	66	88	109	130	151	173	194	215	236
25	4	31	57	84	110	137	163	190	216	243	269	296
30	6	38	70	102	133	165	197	229	261	293	324	356
35	8	45	82	120	157	194	231	268	305	342	380	417
40	10	53	95	138	180	223	265	308	350	393	435	478
45	13	61	109	157	205	252	300	348	396	443	491	539
50	17	70	123	176	229	282	335	388	441	494	547	600
55	20	78	137	195	253	312	370	429	487	545	604	662
60	24	88	151	215	279	342	406	470	533	597	661	724
65	28	97	166	235	304	373	442	511	580	649	718	
70	32	107	181	255	330	404	478	553	627	701		
75	37	117	196	276	356	435	515	595	674			

Table 1.9. Continued.

Table A1.10. Alternate Method of Determining Bases on the AN/FPS-68 (hundreds of feet). Actual height of base is height from the table plus the MSL height of the antenna.

Range (nm)	Elevation Angle (degrees)												
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
5	5	11	16	21	27	32	37	43	48	53	58	64	69
10	11	22	32	43	54	64	75	85	96	106	117	128	138
15	17	33	49	65	81	97	113	129	144	160	176	192	208
20	24	45	66	88	109	130	151	172	193	214	236	257	
25	31	57	84	110	137	163	190	216	242				
30	38	70	101	133	165	197	229						
35	45	82	120	157	194	231							
40	53	95	138	180	223								
45	61	109	157	204									
50	70	123	176	229									
55	78	137	195										
60	88	151	215										
65	97	166	235										
70	107	181	255										
75	117	196	276										
80	127	212											
85	138	228											
90	149	245											
95	161												
100	172												
	(hundreds of feet)												
Range (nm)	13°	14°	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°
5	74	79	85	90	95	100	106	111	116	121	126	131	137
10	149	159	170	180	190	201	211	222	232	243	253	263	273
15	223	239	255	271	287								
	(hundreds of feet)												

Table A1.11. Peak Power Conversion (AN/TPS-68).

Peak Power (KW)	Pt (dB)	Peak Power (KW)	Pt (dB)
150	0.4	185	-0.5
154	0.3	190	-0.6
158	0.2	194	-0.7
161	0.1	198	-0.8
165	0.0	203	-0.9
169	-0.1	208	-1.0
173	-0.2	213	-1.1
177	-0.3	218	-1.2
181	-0.4	223	-1.3

Table A1.12. Pulse Duration Conversion (AN/TPS-68).

(μ sec)	(dB)	(μ sec)	(dB)
2.50	-1.2	1.90	0.0
2.45	-1.1	1.85	0.1
2.40	-1.0	1.80	0.2
2.35	-0.9	1.75	0.4
2.30	-0.8	1.70	0.5
2.25	-0.7	1.65	0.6
2.20	-0.6	1.60	0.7
2.15	-0.5	1.55	0.9
2.10	-0.4	1.50	1.0
2.05	-0.3	1.45	1.2
2.00	-0.2	1.40	1.3
1.95	-0.1	1.35	1.5

Table A1.13. Magnetron Frequency Conversion (AN/TPS-68).

Magnetron Freq (MHz)	$\Delta\lambda^4$ (dB)	Magnetron Freq (MHz)	$\Delta\lambda^4$ (dB)
5480	0.5	5673	-0.1
5512	0.4	5705	-0.2
5543	0.3	5738	-0.3
5575	0.2	5771	-0.4
5608	0.1	5805	-0.5
5640	0.0	5838	-0.6

Table A1.14. USAF Weather Radar Technical Characteristics.

	AN/FPS-77	AN/TPS-68	AN/FPQ-21
Frequency (MHz)	5550 +/- 100	5450 - 5825	5600 - 5650
Wave Length (micro sec)	5.4 +/- 0.1	5.4	5.4
Pulse Duration (micro sec)	2.0	2.0	3.0
Antenna Gain (dB)	39.0	38.0	43.0
Beam Width (degrees)	1.6	2.0	1.1
Pulse Repetition Frequency	324	375	259
Minimum Discernible Signal	-105.4	-104.0	-108.0
Max Range (PPI)	200 NM	200 NM	450 KM/243 NM
Max Range (RHI)	120 NM	100 NM	450 KM/243 NM
Max Range (A/R)	200 NM	200 NM	450 KM/243 NM
Antenna Tilt (degrees)	-2 to 60	-2 to 60	-2 to 60
Azimuth Scan Speed (auto)	5 rpm CW	5 rpm CW	0 - 5 rpm CW or CCW
Antenna Size	8 ft	6.5 ft	12 ft